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MM92/0629

EXAMINER

SOUW, B

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 06/29/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/856,116

Applicant(s)
Chen et al.

Examiner
Bernard Souw

Group Art Unit
2814



☒ Responsive to communication(s) filed on May 15, 2000

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11, 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-8, 11-18, and 20-24 is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-8, 11-18, and 20-24 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s) _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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DETAILED ACTION

Acknowledgment

1. The Amendment A filed 05/15/2000, Paper No.18, in response to the first Office action dated 02/04/2000 has been entered, including three new claims 22-24.

Accordingly, claims 1-8, 11-18, and 20-24 are pending in this Office action.

The present Office action is made with all the suggested amendments being fully considered.

Objections under 37 CFR 1.71 Withdrawn

2. The previous use of the word "plug" to mean "hole" having been amended/corrected (except on page 7 line 7) by adding the word "hole", the previous objection of the disclosure under 37 CFR 1.71 is herewith withdrawn. Same correction has been entered by the Examiner on page 7 line 7.

35 U.S.C. 112 § 1 Rejections Withdrawn

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

Claims 1, 5, 15, 18, and 20 having been amended by addressing a "hole" with the word "feature" in a consistent manner, the previous rejections under 35 U.S.C. 112, first paragraph, is herewith withdrawn.

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New 35 U.S.C. 112 § 1 Rejections

New Matter

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 and 12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 12 recite the limitations of depositing a (second) barrier layer “.... *on substantially the bottom* of the feature using a *directional* sputtering technique”, which is NEW MATTER since the highlighted limitation was not supported by the disclosure. The specification recites on page 6/lines 14-17 in reference to Figs.3-4: “Accordingly, a second barrier layer 24, such as Ta, TaN, TiSiN and/or TaSiN is sputter deposited using a high density plasma process, such as ion metal plasma process, ...”, and on page 7/lines 5-6 in reference to Fig.10: “Next, Cu can be selectively grown in the plug hole in those applications where the underlying layer is a conductive layer which can nucleate CVD of Cu.” Nothing in the specification supports the use of a “*directional* sputtering technique” as recited in claims 1 and 12, and nothing in the disclosure supports the limitation “*on substantially the bottom* of the feature” as recited in claim 1.

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In order to proceed forward with this Office Action, the limitations "*on substantially the bottom of ...*" in claim 1 is simply replaced by -- in the feature --, and the word "*directional*" is simply omitted from claims 1 and 12.

35 U.S.C. 103 (a) Rejections

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Insofar as in compliance with 35 U.S.C. 112 §1, claims 1-6, 11, 22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Ho et al.

● Regarding claim 1, Taguchi et al. disclose a method of filling a feature (=hole) formed in a dielectric layer, comprising:

- a) depositing a generally conformal first barrier layer 3 on a bottom and sidewalls of the feature shown in Fig.2a, as recited in Col.5/ll.4-6;
- b) removing the first barrier layer 3 formed on the bottom of the feature, as shown in Fig.2b, as recited in Col.5/ll.11-19;
- c) depositing a second barrier layer 4 *in the feature using a sputtering technique*, wherein the second barrier layer 4 comprises a material selected from a group consisting of Ta, TaN, TaSiN,

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TiSiN, and combinations thereof, as recited by Taguchi's in Col.5/ll.20-23 and Col.9/ll.33-37, whereby Taguchi's second barrier layer 4 is made of Ti (Col.5/line 20) or TiN (Col.9/line 36).

It is a general knowledge in the art that Ta, TaN, Ti and TiN are equivalent alternatives for barrier layers (see e.g. Ho et al., Col.6/ll.9-13 & ll.41-47). Therefore, substituting TiN in Taguchi's barrier layer 4 with Ta or TaN is not an act of invention, and hence, unpatentable. *In re Ruff*, 256 F.2d 590, 118 USPQ 340, 343 (CCPA 1958). Unpatentability not only applies where equivalency is disclosed in the prior art, but also where such equivalency would have been obvious. *Id.* at 599, 118 USPQ at 348.

Therefore, it would have been obvious to one ordinarily skilled in the art at the time the invention was made to select any one of these materials as a suitable barrier layer 4 of Taguchi's, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 125 USPQ 416.

Still regarding claim 1, Taguchi et al. proceeds further with the steps of:

d) depositing a metal layer 5 in the feature, as shown in Fig.2d and disclosed in Col.5/ll.20-23.

However, Taguchi's metal layer 5 is not copper. Ho et al. deposits copper layer 26 shown in Fig. 1b to fill the contact via holes 20 lined by Ta barrier layers 24 shown in Fig. 1a.

It would have been further obvious to one ordinarily skilled in the art at the time the invention to substitute Taguchi's Al-Si layer 5 in Fig.2d by Ho's copper layer, since copper is more desirable than aluminum owing to its lower resistivity and higher electromigration resistance.

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- Regarding claim 2, the limitation that the 1st barrier layer is deposited using CVD techniques is disclosed by Taguchi et al. in Col.5/ll.4-6.
- Regarding claim 3, the limitation that the 1st barrier layer comprises Si_xN_y is disclosed by Taguchi et al. in Col.5/line 4.
- Regarding claim 4, the limitation that the 1st barrier layer formed on the bottom of the feature is removed using etching techniques is disclosed by Taguchi et al. in Col.5/ll.11-19
- Regarding claim 5, the limitation the step of depositing the metal layer comprises depositing the metal layer at least partially on the first and second barrier layers, is disclosed as metal layer 5 shown in Fig.2d, which is deposited on the first barrier layer 3a and the second barrier layer 4 shown in Fig.2d, as recited in Col.5/ll.11-54.
- Regarding claim 6, the limitation that the metal layer is deposited using CVD techniques is disclosed by Ho et al. in Col.6/ll.22-43.
- Regarding claim 11, the limitation that the first barrier layer is deposited to a thickness of between about 50Å to about 100Å is disclosed by Taguchi et al. in Col.5/ll.4-6, reciting a thickness of about 0.1 μm for the first barrier layer 3 shown in Fig.2a.

Generally, differences in concentration, temperature, or layer thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation".

In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

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Under that standard, "it is not inventive to discover the optimum or workable ranges by routine experimentation", only if the "results of optimizing a variable" are "unexpectedly good" can a patent be obtained for the claimed critical range. *In re Geisler* CA FC, No. 96-1362, 7/7/97.

Furthermore, it is well established that unexpected results must be established by factual evidence. "Mere argument or conclusory statements in the specification does not suffice" *In re Geisler* CA FC, No. 96-1362, 7/7/97.

- Regarding new claim 22, the step of depositing the metal layer of claim 1 using electroplating techniques is conventional, and hence trivial to one of ordinary skill in the art.
- Regarding new claim 24, the limitation that the second barrier layer of claim 1 is deposited to a thickness of between about 400Å is disclosed by Taguchi et al. in Col.5/ll.31-33, reciting a thickness of about 0.1 µm for second barrier layer 4 shown in Figs.2c-d.

Generally, differences in concentration, temperature, or layer thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Under that standard, "it is not inventive to discover the optimum or workable ranges by routine experimentation", only if the "results of optimizing a variable" are "unexpectedly good" can a patent be obtained for the claimed critical range. *In re Geisler* CA FC, No. 96-1362, 7/7/97.

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Furthermore, it is well established that unexpected results must be established by factual evidence. "Mere argument or conclusory statements in the specification does not suffice" *In re Geisler* CA FC, No. 96-1362, 7/7/97.

6. Insofar as in compliance with 35 U.S.C. 112 § 1, claims 7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Ho et al., and further in view of Barnes et al.

Taguchi et al. as modified by Ho et al. show all the limitations of claims 7 and 12, as applied to claims 1-5 above, except the recitation of depositing the metal layer by PVD methods (claim 7) and by sputter deposition under the conditions of a high density plasma (claim 12).

- Regarding claim 7, the step of depositing the metal layer by PVD methods is disclosed by Barnes et al. in Col.4/ll.2-4.

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify Taguchi's method by Barnes's, i.e., depositing copper by PVD instead of CVD, since the PVD does not make use of any chemical reaction and is therefore free from residues that may contaminate and harm the product.

- Regarding claim 12, the limitation that the metal layer of claim 1 is deposited using sputtering techniques is disclosed by Taguchi et al. in Col.5/ll.50-54, and shown as metal layer 5 in Fig.2d. To substitute Taguchi's Al-1%Si sputtered metal with copper is conventional and hence trivial, since

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it is well-known to one of ordinary skill in the art that copper, too, can be sputter-deposited, as disclosed by Barnes et al. in Col.4/ll.2-4.

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify Taguchi's by Ho et al., i.e., using tantalum as a second barrier metal, and further modify by Barnes et al. to sputter-deposit copper under the conditions of a dense plasma. Motivations for using copper and tantalum have been previously discussed with regard of claims 1 and 6.

It would have been obvious to one with ordinary skill in the art at the time of the invention to deposit copper by sputtering, owing to the increased deposition rate and the superior properties of sputter grown films, as suggested by Barnes et al., in Col.6/ll.67-68 and Col.7/ll.1-5.

7. Insofar as in compliance with 35 U.S.C. 112 § 1, claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Ho et al. and Barnes et al., and further in view of Kurino et al..

Taguchi et al. as modified by Ho et al. and Barnes et al. show all the limitations of claims 13 and 14, as previously applied to claim 12, except the recitations of heating the metal layer to a temperature of between about room temperature and about 500°C and then applying a pressure in the range of about 1000 psi to about 100,000 psi.

Kurino et al. describe a method of filling high aspect ratio via holes 21 & 22 shown in Fig.10b with a metal layer 20 shown in Fig.10d, wherein the metal layer 20 is heated to a temperature of between about 350°C and 450°C, as recited in Col.6/ll.43-44, and then subjecting the metal layer 20

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to a pressurized environment in the range of about 580 psi (4MPa) to about 1,160 psi (8 MPa) as shown in Fig.10e, as recited in Col.6/line 46.

Generally, differences in pressure, temperature, or layer thickness will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such pressure or temperature is critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

A *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one ordinarily skilled in the art would have expected them to have the same properties. *In re Titanium Metals Corporation of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify Taguchi's by Ho's and Barnes's, and further by Kurino's, in order to force the conductive material into the high aspect ratio holes, as taught by Kurino et al. in Col.5/ll.45-49.

8. Insofar as in compliance with 35 U.S.C. 112 § 1, claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Ho et al., and further in view of Gardner and Barnes et al.

Taguchi et al. as modified by Ho et al. show all the limitations of claims 8 and 20, as applied previously to claims 1 and 5, respectively, except the limitation that the metal layer is deposited by

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first depositing the metal layer using chemical vapor deposition techniques and then depositing the metal layer using physical vapor deposition techniques.

Gardner deposit prior to the metal layer 202 in Fig.2e a first metal layer as a wetting layer 206 using chemical vapor deposition techniques, as disclosed in Col.6/ll.21-41.

The step of filling the feature with a metal layer by PVD methods is disclosed by Barnes et al. in Col.4/ll.2-4.

9. Claims 15-18 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Tseng et al.

Taguchi et al. disclose a method of filling a via-hole formed in a dielectric layer, comprising the steps of:

- c) depositing a second barrier layer 3 on a bottom and sidewalls in the feature shown in Fig.2a and recited in Col.5/ll.4-6, as previously applied to claim 1 step (a);
- d) removing the second barrier layer 3 formed on the bottom of the feature shown in Fig.2b recited in Col.5/ll.11-19, leaving only portions of barrier layer 3a on the walls 2a of the feature, as previously applied to claim 1 step (b) ;
- e) selectively depositing a metal layer 5 in the feature as shown in Fig.2d and disclosed in Col.5/ll.20-23.

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However, Taguchi et al. do not teach to deposit a first barrier layer over a blanket dielectric layer and form a via hole through the barrier layer and the dielectric layer to expose an underlayer. Tseng et al. perform, prior to step (c), a photolithographic patterning step comprising:

- a) depositing a first barrier layer 8 over a blanket dielectric layer 7, as shown in Fig.2 and recited in Col.3/ll.37-41;
- b) forming a feature through the barrier layer 8 and the dielectric layer 7 to expose an underlayer 6, as shown in Fig.2 and recited in Col.3/ll.41-45.

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify Taguchi's by Tseng et al., i.e., depositing a first barrier layer over a blanket dielectric layer, and then forming a via hole through the barrier layer and the dielectric layer, since these steps are conventional parts of a photolithographic patterning process to form a via hole through the barrier layer and the dielectric layer to expose an underlayer, whereby the barrier layer serves as an antireflection coating in the photolithographic process.

- Regarding claim 16, the limitation that the first barrier layer (Tseng's layer 8) and the second barrier layer (Taguchi's layer 3) are comprised of Si_xN_y is disclosed by Tseng et al. in Col.3/ll.37-41 and by Taguchi et al. in Col.5/line 4, respectively.

It would have been obvious to one with ordinary skill in the art at the time of the invention to continue Tseng's photolithographic patterning process immediately with Taguchi's method of filling the via holes with metal plugs, thereby leaving Tseng's silicon nitride antireflection coating and

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barrier layer essentially intact before starting with Taguchi's metallization process, since the first layer in Taguchi's is also a silicon nitride barrier layer.

- Regarding claim 17, the limitation that the barrier layer is deposited using CVD techniques is disclosed by Taguchi et al. in Col.5/ll.4-6. The limitation of depositing both the 1st and the 2nd barrier layers by the same (Taguchi's) method is trivial, since both barrier layers are made of the same material (Si_xN_y).

It would have been obvious to one with ordinary skill in the art at the time of the invention to modify Taguchi's by Tseng et al., thereby depositing the first barrier layer and second barrier layers according to Taguchi's method in order to simplify the process, since both barrier layers are of the same material silicon nitride.

- Regarding claim 18, the limitation that the second barrier layer formed on the bottom of the feature is removed using sputter etching techniques is disclosed by Taguchi et al. in Col.5/ll.11-19.
- Regarding claim 23, the step of depositing the metal layer of claim 15 using electroplating techniques is conventional, and hence trivial to one of ordinary skill in the art.

10. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taguchi et al. in view of Tseng et al., and further in view of Ho et al.

Taguchi et al. as modified by Tseng et al. show all the limitations of claim 21, as applied previously to claim 15, except the limitation that the metal layer of claim 15 comprises copper. Ho et al. disclose that the metal layer used to fill-in the hole of claim 15 is copper, as shown by copper

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layer 26 shown in Fig. 1b filling the contact via holes 20 lined by TiN or Ta barrier layers 24 shown in Fig. 1a, as recited in Col.6/ll.22-25 and Col.6/ll.41-47.

Response to Applicant's Arguments

11. Applicant's arguments filed 05/15/2000 have been fully considered but they are not persuasive. The following is Examiner's response to Applicant's arguments.

12. Regarding Applicant's argument that Taguchi et al. does not teach, show, or suggest removing the first barrier layer formed on the bottom of the feature, said Taguchi's teaching is clearly shown in Fig.2b, as recited in the rejection of claim 1 above. Regarding Applicant's further argument that Taguchi et al. does teach, show, or suggest depositing a second barrier layer ***substantially on the bottom of the feature***, it is noted that the claimed limitation is neither taught, shown, nor suggested in Applicant's entire disclosure.

Even if Applicant's new/amended claim of depositing a second barrier layer ***substantially on the bottom of the feature*** would have been legitimate (not a new matter), this added limitation would not make the claim patentable, since the claim does not preclude deposition of second barrier materials *also* on the walls of the feature, and hence, Taguchi's method would satisfactorily meet the claim, unless Applicant were able to show (without introducing new matter) that Applicant's claimed method is critical, resulting in a distinctive barrier properties superior than Taguchi's, or those obtained by other deposition methods. In providing distinctive results, it is well established that

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distinctive results must be established by factual evidence. Mere argument or conclusory statements in the specification does not suffice.

Even if Applicant's new/amended claim of depositing a second barrier layer *substantially on the bottom of the feature* would have been legitimate (not a new matter), this added limitation would not make the claim patentable, since a method for depositing a barrier layer *substantially on the bottom of the feature* is well known in the art, e.g., by ionizing the sputtered atoms in a plasma and applying voltage bias between plasma and substrate.

Unpersuasive argument: Attacking the references individually

13. In response to Applicant's argument that Ho et al. and Barnes et al. do not teach, show, or suggest removing the first barrier layer formed on the bottom of the feature, one cannot show nonobviousness by attacking references individually where the rejections, where 35 U.S.C. 103(a) rejections are based on combinations of references (said limitations are obvious over Taguchi's). See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Unpersuasive argument: No suggestion to combine

14. In response to Applicant's argument that Taguchi's aluminum metallization process can not be combined with Tseng's polysilicon plug formation, it must be firstly emphasized that both methods are directed to deposit conductive material into plug holes or features.

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Secondly, and most importantly, Tseng's was not cited for polysilicon plug formation, but for depositing a first barrier layer over a blanket dielectric layer and form a via hole through the barrier layer and the dielectric layer to expose an underlayer, instead of depositing the barrier layer into a via hole as Taguchi's. This process sequence of Tseng differs from Taguchi's, and can be used to modify Taguchi's completely irrespective of whether a polysilicon or an aluminum or copper metallization is being formed *afterwards*. Similarly, only a person unskilled in the art would follow Applicant's suggestion to substitute Tseng's polysilicon with Ho's copper without any complementary process steps. It is also noted that the suggestion was only made by Applicant, not by the Examiner.

In this regard, Applicant is seriously advised to only argue about teachings from prior art references that have been cited by the Examiner in the previous Office Action(s). It does not make sense to cite other teachings in the prior arts that are not cited by the Examiner, since one of ordinary skill in the art would certainly know, there would be a large number of steps that would *not* match Applicant's invention.

15. In response to applicant's general argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

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In the instant cases, the rationale to modify or combine the prior arts does not have to be expressly stated in the prior arts; in the present case the rationale is reasoned from knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

This relates to suggestion/motivation in that “having established that this knowledge was in the art, the Examiner could then properly rely ... on a conclusion of obviousness ‘from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference’.” *In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969).

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E. Souw whose telephone number is (703) 305-3303. The examiner can normally be reached on Monday-Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudury, can be reached on (703) 306-2794. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or -7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center receptionist at (703) 308-0956.

BES

Bernard E. Souw

June 27, 2000

Tom Thomas

Tom Thomas
Supervisory Patent Examiner
Technology Center 2800